

# PCI2318

## User's Manual



**Beijing ART Technology Development Co., Ltd.**

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## Chapter 1 Overview

In the fields of Real-time Signal Processing, Digital Image Processing and others, high-speed and high-precision data acquisition modules are demanded. ART PCI2318 data acquisition module, which brings in advantages of similar products that produced in china and other countries, is convenient for use, high cost and stable performance.

ART PCI2318 is a data acquisition module based on PCI bus. It can be directly inserted into IBM-PC/AT or a computer which is compatible with PCI2318 to constitute the laboratory, product quality testing center and systems for different areas of data acquisition, waveform analysis and processing. It may also constitute the monitoring system for industrial production process.

### Software

#### Analysis Software

ART PCI2318 module is well-suited for precision data acquisition analysis applications, which you can specifically address with the ART Data Acquisition Measurement Suite. The suite has two components –digital and graphics mode analysis (functions) for voltage (any signal can be transformed into the voltage signal), frequency response and other analysis.

### Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.

Check for the following items in the package. If there are any missing items, contact your local dealer or sales.

- PCI2318 Data Acquisition Board
- ART Disk
  - a) user's manual (pdf)
  - b) drive
  - c) catalog
- Warranty Card

### FEATURES

#### Analog Input

- Input Range:  $\pm 10V$ ,  $\pm 5V$ ,  $\pm 2.5$ ,  $0\sim 10V$ ,  $0\sim 5V$
- 16-bit resolution
- Sampling Rate: 250KS/s maximum
- Analog Input Mode: 32SE/16DI
- Data Read Mode: program read
- Clock Source: internal clock
- AD Conversion Time:  $\leq 1.25\mu S$
- Programmable Gain: 1, 2, 4, 8 (AD8251 default )or 1, 2, 5, 10 (AD8250) or 1, 10, 100, 1000 (AD8253)
- Analog Input Impedance:  $10M\Omega$

- Amplifier Set-up Time: 785nS(0.001%)(max)
- Non-linear error:  $\pm 2$ LSB(Maximum)
- System Measurement Accuracy: 0.01%
- Operating Temperature Range: 0°C~55°C
- Storage Temperature Range: -20°C~70°C

### **Analog Output**

- Output Range:  $\pm 10$ V,  $\pm 5$ V, 0~10V, 0~5V or 0~10mA, 0~20mA
- 12-bit resolution
- Set-up Time: 10 $\mu$ S
- Channel No.: 4-channel
- Non-linear error:  $\pm 2$ LSB(Maximum)
- Operating Temperature Range: 0°C~55°C
- Storage Temperature Range: -20°C~70°C

### **Other features**

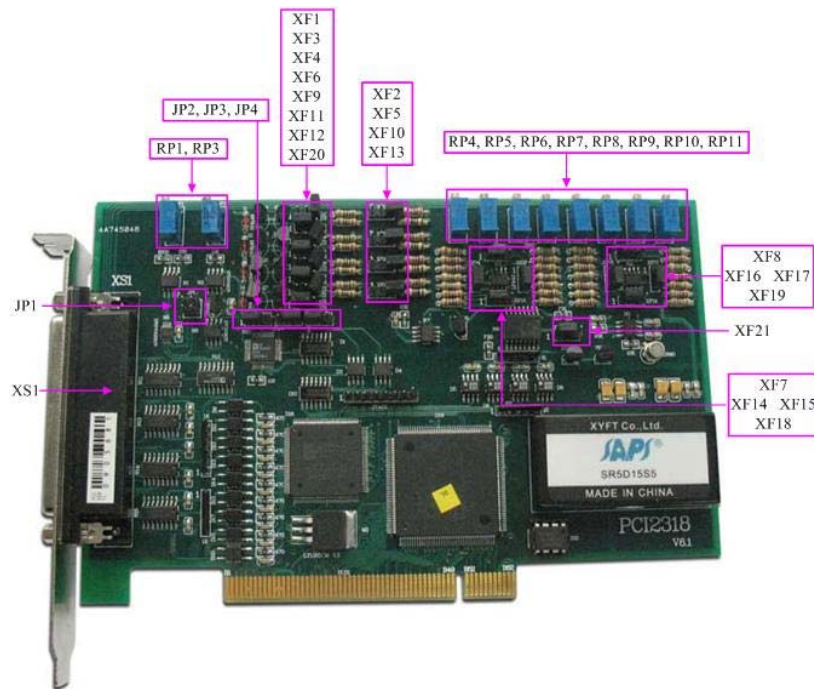
Board Clock Oscillation: 10MHz

### **Dimension**

175.5mm (L) x 113mm (W) x 16mm (H)

## Chapter 2 Components Layout Diagram and a Brief Description

### 2.1 The Main Component Layout Diagram



### 2.2 The Function Description for the Main Component

#### 2.2.1 Signal Input and Output Connectors

XS1: analog signal inputs and outputs connector

#### 2.2.2 Potentiometer

RP1: Amplifier zero-point adjustment potentiometer

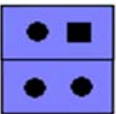
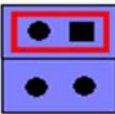
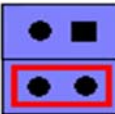
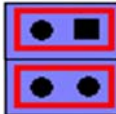
RP2: Analog signal input full-scale adjustment potentiometer

RP4, RP6, RP8, RP10: Analog output VOUT0~VOUT3 zero point adjustment potentiometer



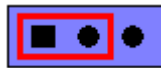



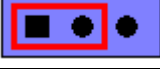
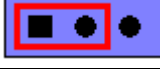
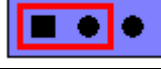






RP5, RP7, RP9, RP11: Analog output VOUT0~VOUT3 full-scale adjustment potentiometer

## 2.2.3 Jumper

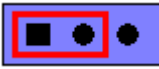
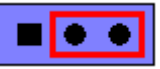
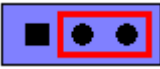

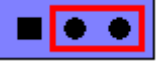







JP1: Analog input gain setting

	1	2	4	8
JP1				

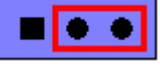

JP2, JP3, and JP4: Analog input range setting

	JP2	JP3	JP4
$\pm 10V$			
$\pm 5V$			
$\pm 2.5V$			
0~10V			
0~5V			

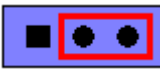
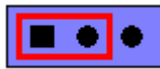
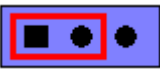
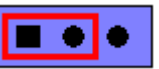
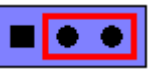



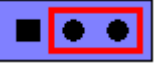

Voltage output (VOUT0~VOUT3) range setting

VOUT0	XF3	XF14	XF18
VOUT1	XF6	XF15	XF7
VOUT2	XF11	XF16	XF19
VOUT3	XF20	XF17	XF8
$\pm 10V$			
$\pm 5V$			
0~10V			
0~5V			

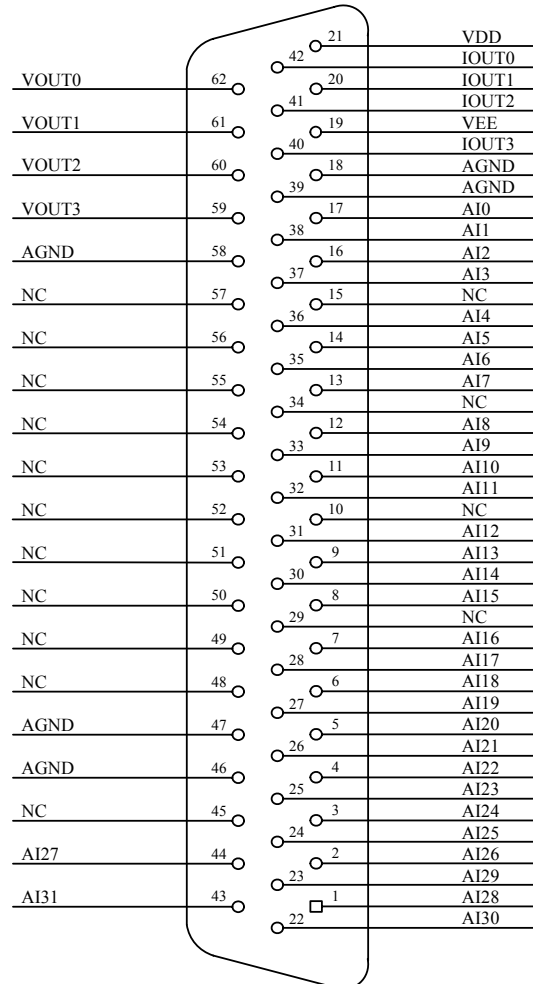
XF12: Analog output default value setting

	XF21	Description
Unipolar		If the analog output range is unipolar, the default value of analog output is 0V when power-on
Dipolar		If the analog output range is dipolar, the default value of analog output is 0V when power-on

Current output (IOUT0~IOUT3) range setting

IOUT0	XF3	XF14	XF18	XF1	XF2
IOUT1	XF6	XF15	XF7	XF4	XF5
IOUT2	XF11	XF16	XF19	XF9	XF10
IOUT3	XF20	XF17	XF8	XF12	XF13
0~10mA					
4~20mA					

## 62 core plug on the XS1 pin definition



Pin name	Pin feature	Pin function definition
AI0~AI31	Input	Analog input, reference ground is AGND.
VOUT~VOUT3	Output	Voltage output, reference ground is AGND.
IOUT0~IOUT3	Output	Current output, reference ground is AGND.
AGND	GND	Analog ground. This AGND pin should be connected to the system's AGND plane.
VDD	PWR	+15V power supply output
VEE	Output	External power supply input, use it when the output is current.
+5V	Output	5V power supply output.



## Chapter 4 Connection Ways for Each Signal

### 4.1 Analog Input Single-ended Connection

Single-ended mode can achieve a signal input by one channel, and several signals use the common reference ground. This mode is widely applied in occasions of the small interference and relatively many channels.

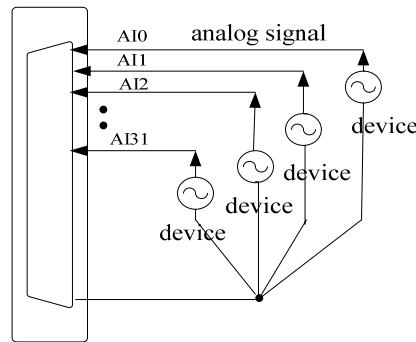


Figure 4.1 single-ended input connection

### 4.2 Differential Inputs

Double-ended input mode, which was also called differential input mode, uses positive and negative channels to input a signal. This mode is mostly used when biggish interference happens and the channel numbers are few. Single-ended/double-ended mode can be set by the software, please refer to PCI2318 software manual.

According to the diagram below, PCI2318 board can be connected as analog voltage double-ended input mode, which can effectively suppress common-mode interference signal to improve the accuracy of acquisition. Positive side of the 16-channel analog input signal is connected to AI0~AI15, the negative side of the analog input signal is connected to AI16~AI31-, equipments in industrial sites share the AGND with PCI2318 board.

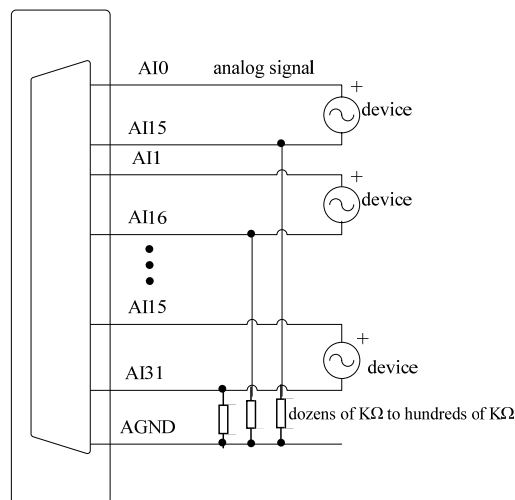


Figure 4.2 double-ended input connection

### 4.3 Analog output connection

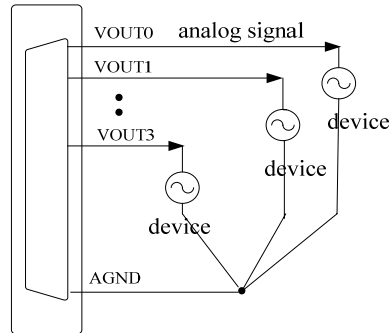


Figure 4.3 voltage output connection

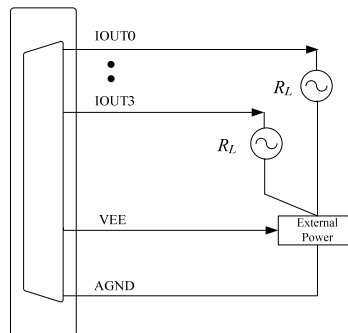


Figure 4.4 current output connection

Note:  $RL \cdot I_{max} + 7V \leq \text{External power} \leq 36V$

$0 \leq RL \leq 1k\Omega$

When select the 4~20mA range,  $I_{max}$  is 20mA, when select the 0~10mA range,  $I_{max}$  is 10mA.

## ***Chapter5 Notes, Calibration and Warranty Policy***

### **5.1 Notes**

In our products' packing, user can find a user manual, a PCI2318 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using PCI2318, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PCI2318 module.

### **5.2 Analog Signal Input Calibration**

Every device has to be calibrated before sending from the factory. It is necessary to calibrate the module again if users want to after using for a period of time or changing the input range. PCI2318 default input range:  $\pm 10V$ , in the manual, we introduce how to calibrate PCI2318 in  $\pm 10V$ , calibrations of other input ranges are similar.

Prepare a digital voltage instrument which the resolution is more than 5.5 bit, install the PCI2318 module, and then power on, warm-up for fifteen minutes.

- 1) Amplifier calibration: Select AI0 and AI1 for example; connect a DC voltage source with value equal to 0V to AI0 and connect a DC voltage source with value equal to 10V to AI1. Use voltmeter to measure the 7 pin of the amplifier N6. Adjust RP1 until the measured value is 0V.
- 2) Full-scale adjustment: Select AI0 for example; connect a DC voltage source with value equal to 9997.55mV to AI0. Adjust RP5 until the actual input value 9997.55mV.
- 3) Repeat steps above until meet the requirement.

### **5.3 Analog Signal Output Calibration**

In the manual, we introduce how to calibrate PCI2318 in  $\pm 10V$  output range; calibrations of other input ranges are similar.

- 1) Zero adjustment: Set analog output values to 0V. Adjust RP4, RP6, RP8 and RP10 until the actual output values of the corresponding channels are 0V.
- 2) Full-scale adjustment: Set analog output values to 9995.11mV. Adjust RP5, RP7, RP9 and RP11 until the actual output values of the corresponding channels are 9995.11mV.
- 3) Repeat steps above until meet the requirement.

### **5.4 DA use**

In demonstration program, the continuous output interval of waveform output can not be carried out; the main objective

is to test the strength of analog output.

## 5.5 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: [www.art-control.com](http://www.art-control.com).
2. All ART products come with a limited two-year warranty:
  - The warranty period starts on the day the product is shipped from ART's factory
  - For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
  - Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.
3. Our repair service is not covered by ART's guarantee in the following situations:
  - Damage caused by not following instructions in the User's Manual.
  - Damage caused by carelessness on the user's part during product transportation.
  - Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
  - Damage from improper repair by unauthorized ART technicians.
  - Products with altered and/or damaged serial numbers are not entitled to our service.
4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.
5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.

# Products Rapid Installation and Self-check

## Rapid Installation

Product-driven procedure is the operating system adaptive installation mode. After inserting the disc, you can select the appropriate board type on the pop-up interface, click the button **【driver installation】** ; or select CD-ROM drive in Resource Explorer, locate the product catalog and enter into the APP folder, and implement Setup.exe file. After the installation, pop-up CD-ROM, shut off your computer, insert the PCI card. If it is a USB product, it can be directly inserted into the device. When the system prompts that it finds a new hardware, you do not specify a drive path, the operating system can automatically look up it from the system directory, and then you can complete the installation.

## Self-check

At this moment, there should be installation information of the installed device in the Device Manager (when the device does not work, you can check this item.). Open "Start -> Programs -> ART Demonstration Monitoring and Control System -> Corresponding Board -> Advanced Testing Presentation System", the program is a standard testing procedure. Based on the specification of Pin definition, connect the signal acquisition data and test whether AD is normal or not. Connect the input pins to the corresponding output pins and use the testing procedure to test whether the switch is normal or not.

## Delete Wrong Installation

When you select the wrong drive, or viruses lead to driver error, you can carry out the following operations: In Resource Explorer, open CD-ROM drive, run Others-> SUPPORT-> PCI.bat procedures, and delete the hardware information that relevant to our boards, and then carry out the process of section I all over again, we can complete the new installation.